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**CLAIMS**

[Claim(s)]

[Claim 1] The fluid injector which is a fluid injector which injects a predetermined liquid using a fluid injection head, and is characterized by having an injection means to inject a gas after injecting to the fluid injection field of said fluid injection head while injecting a liquefied object or.

[Claim 2] Said injection means is a fluid injector according to claim 1 characterized by having the 1st injection tip which injects the penetrant remover as said liquefied object, the 2nd injection tip which injects said gas, and said 1st and 2nd injection tip inside, and having a wrap cap means for the fluid injection field of said fluid injection head.

[Claim 3] Said cap means is a fluid injector according to claim 2 characterized by having an acceptance means for having said 1st and 2nd injection tip in the upper part side of the fluid injection field of said fluid injection head, and receiving said liquefied object caudad from said fluid injection field.

[Claim 4] The fluid injector according to claim 3 characterized by having a derivation means for it being open for free passage for said acceptance means within said cap means, and deriving the liquefied object in said acceptance means out of said cap.

[Claim 5] It is the fluid injector according to claim 1 characterized by injecting a gas after injecting while said fluid injection head is held at the head electrode holder holding said fluid injection head and said injection means injects said liquefied object towards said head holder - or.

[Claim 6] Said fluid injection head is a fluid injector given in one of claim 1 terms thru/or claim 5 terms characterized by having the electric thermal-conversion object which generates the heat energy for producing and cheating out of film boiling into said liquid, and carrying out the regurgitation of the liquid.

[Claim 7] In the method of recovery of the ink jet record which records while moving relatively the record medium by which ink record is carried out with the record means equipped with the ink injection field equipped with two or more ink discharge parts The method of recovery for ink jet record characterized by having the 1st recovery process which injects a liquefied object and a gas to said ink injection field, and the 2nd recovery process which cleans said ink injection field in the direction which intersects the injection direction in said ink injection field after the 1st recovery process.

[Claim 8] It has two or more ink discharge parts. In the method of recovery of the ink jet record which records while moving relatively the record medium by which ink record is carried out with the record means equipped with the ink injection field equipped with the electric thermal-conversion object which generates the heat energy for producing and cheating out of film boiling in the ink of each ink discharge part, and carrying out the regurgitation of the liquid The, 1st recovery process which injects a liquefied object and a gas to said ink injection field, and the 2nd recovery process which cleans said ink injection field after the 1st recovery process, The method of recovery for ink jet record characterized by having the 3rd recovery process to which ink injection which drives said electric thermal-conversion object from said each of two or more ink discharge part, and is different from record after the 2nd recovery process is made to carry out.

[Claim 9] They are claim 7 which said record means is held through predetermined spacing at the head electrode holder in said ink injection field which carries out the regurgitation of the different ink, respectively, and is characterized by said 1st process injecting said liquefied object and gas towards said head holder -, or the method of recovery for ink jet record according to claim 8.

[Claim 10] They are claim 7 characterized by performing the process which said record means has a pressurization recovery means, and said method of recovery operates said pressurization recovery means before record activation, and carries out pressurization recovery, and performing said 1st, 2, and 3 recovery process after this, or the method of recovery for ink jet record according to claim 8.

[Claim 11] Said 1st, 2, and 3 recovery process is the method of recovery for ink jet record according to claim 10 characterized by performing for every predetermined record process to said record medium.

[Claim 12] In the ink recording device equipped with the means to which the blanket-like object by which ink record is carried out with the record means equipped with the ink injection field equipped with two or more ink discharge parts and said record means is moved relatively, and a recovery means to recover said record means Said recovery means is an ink recording device characterized by having an injection means to inject a gas after injecting a liquefied object to the ink injection field of said ink injection head, and a cleaning means to clean said ink injection field processed by this injection means.

[Claim 13] Said recovery means is an ink recording device according to claim 12 characterized by making the cleaning direction by said cleaning member into the direction where said liquefied object and gas cross to the injection direction in the ink injection field injected by said ink injection field.

[Claim 14] Said recovery means is an ink recording device according to claim 12 or 13 characterized by having the cap device which equips the interior with the injection section of said injection means, and the acceptance means for receiving said liquefied object which passed through said ink injection field.

[Claim 15] The record means equipped with the ink injection field which was equipped with two or more ink discharge parts, and was equipped with the electric thermal-conversion object which generates the heat energy for producing and cheating out of film boiling in the ink of each ink discharge part, and carrying out the regurgitation of the liquid, In the ink recording device equipped with the means to which the blanket-like object by which ink record is carried out with said record means is moved relatively, and a recovery means to recover said record means said recovery means An injection means to inject a gas after injecting a liquefied object to the ink injection field of said ink injection head, A cleaning means to clean said ink injection field processed by said injection means, The ink recording device characterized by having a means to make ink injection which drives said electric thermal-conversion object from said each of two or more ink discharge part of said ink injection field cleaned by said cleaning means, and is different from record perform.

[Claim 16] The fluid injector characterized by having an injection means to inject a gas after injecting while being the fluid injector which injects a predetermined liquid using the fluid injection head equipped with the fluid injection field which turns caudad from the upper part and exists and injecting a liquefied object to the upper part region of the fluid injection field of said fluid injection head in a fluid injection condition or.

[Claim 17] It has two or more liquid discharge parts. It is the fluid injector which injects a predetermined liquid using the fluid injection head equipped with the fluid injection field which turns caudad and exists from the upper part in a fluid injection condition while having the electric thermal-conversion object which generates the heat energy for producing and cheating out of film boiling into the liquid of each liquid discharge part, and carrying out the regurgitation of the liquid. An injection means to inject a gas after injecting to the upper part region of the fluid injection field of said fluid injection head while injecting a liquefied object or, The fluid injector characterized by having a means to perform liquid discharge which drives the account electrical-and-electric-equipment thermal-conversion object of recovery back to front by said injection

means, and is different from record.

[Claim 18] Said fluid injector is a fluid injector according to claim 17 characterized by having a cleaning means to clean said ink injection field processed by this injection means before actuation of said liquid discharge means.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention offers in detail the optimal method of recovery and the optimal recording device for the recording device which performs predetermined record to record media, such as paper, cloth, a nonwoven fabric, and an OHP form, about the equipment using the fluid injection head which injects liquids, such as ink. This invention offers especially invention effective in a recording device which records the cloth of a long time or a recording width 1m or more continuously. A concrete application device can mention business machines, such as a printer, a copying machine, facsimile, and a printer, a mass-production-method device, the equipment that drives a body using the liquid injected further.

[0002]

[Description of the Prior Art] In the conventional fluid injector, there is equipment which recorded by having injected the liquid, or injected the special liquid, and used this. Since the discharge part which generally injects a liquid is very small, if the liquid itself fixes or the condition that the color and pigment which are mixed into the liquid fix arises, poor injection is produced, in a recording device, poor record may arise and the problem of it becoming impossible to use an injection liquid efficiently will arise. Usually, before these problems occur, it is suitable spacing and performs in the forced discharge of the liquid by suction, pressurization, etc. known as a recovery means, and either of cleaning a regurgitation field with a discharge part.

[0003] On the contrary, in order to avoid grinding a regurgitation field against a cleaning member compulsorily, the equipment which performs processing which gives and blows away air indirectly is also realized.

[0004] Moreover, the ink droplet adhering to the delivery side of a recording head is made to mix in each liquid route of the recording head of another color, the color mixture of ink is caused in the record liquid route of each recording head, and the technical problem that a good image cannot be obtained is also known for a record means to inject the liquid of a color with which plurality differs when performing recovery.

[0005] Even if a (background technique) and time performed this invention persons periodically with the above-mentioned conventional recovery means, the situation which poor record and poor injection produce was faced. 1m or more, especially this inclination had it, when the die length of 1 scan according a long record medium to a scan mold recording device, i.e., the width of face of a record medium, recorded using the ink which used a color which is used for textile-printing record, a certain case and. [ remarkable ]

[0006] If it is in the head which inclines to a horizontal plane and performs record and injection when it pursues about this cause Ink, paper powder or fiber, etc. begins to fix into the part which a cleaning blade contacts in a lower part in the first stage rather than the field which injects ink and the liquid (it is only hereafter called the ink) of a head. It has solved that reduced gradually the cleaning effectiveness by the side of a lower part, and the ink injection property was falling as a result. When fiber became a cause especially, the property change was very remarkable. When fiber existed in the injection field, soiling a head front face conversely was also seen as if it changed into the condition of flipping a blade and the fiber cleaned the blade itself.

[0007] Then, this invention persons are making the plurality of a recovery means act on a recording head, and perceived attaining recovery. Although it performed carrying out blade cleaning to coincidence after giving the penetrant remover known from usual to the head front face or, the recovery condition showed the inclination which worsens conversely. When this phenomenon was pursued, it turned out that the part from which the affix softened by the penetrant remover enters the interior of a delivery, and produces the poor regurgitation is increasing. On the other hand, although the cure which supplies a penetrant remover in large quantities was taken, since the processor of the penetrant remover after use became huge and the recovery time also turned into long duration, it became clear that it is not practical. The need for the method of recovery which can attain a recovery condition efficiently became one purpose of this invention from this viewpoint.

[0008] Furthermore, from the contents of a Prior art, exclusion of the fiber from a head front face is an unsolvable big problem, and that how it is continued as another purpose of this invention also securing the proper condition which can be injected by eliminating fiber can mention it.

[0009] By the way, by this invention, although it is possible to ensure recovery by adopting a respectively special configuration to each injection tip of the recording head equipped with two or more injection section, though it is more small, it also sets to one of the purposes from another viewpoint to offer the configuration which heightens a restorative effect more effectively. This became possible because the inclination and \*\* which the lower part section tends to fix [ ink, paper powder or fiber, etc. ] relatively rather than the upper part section about the head which inclines to the above-mentioned horizontal plane and performs record and injection, and the center section of the injection field became clear. That is, the configuration which can attain this purpose is giving injection of liquefied objects, such as water, and washing material, dissolution material, and a gas injection to the upper part section of an injection field, and is based on the operation which can use the injection force for recovery more efficiently.

[0010] Although a record means to perform two or more colors and shade record generally takes the configuration equipped with two or more fluid injection sections through a non-injecting field, the problem of mixing of the color at the time of recovery changes the property of record ink. The more desirable technical problem of this invention can also solve this problem, and is also in offer of invention which can attain proper recovery. This technical problem can be attained by applying the basic configuration of this invention to each of a fluid injection field and a non-injecting field (it corresponds to the electrode holder of an example etc.).

[0011] Moreover, although the head equipped with two or more fluid injection sections through a non-injecting field might usually have the configuration from which the fluid injection section turns into a crevice to a non-injecting field, in such a case, the inclination for removal of the fixing object in a crevice and the fixing object softened with the solvent etc. to enter a corner and a crevice on the contrary was seen. It is also still more nearly another technical problem of this invention to solve this technical problem.

[0012] Furthermore, when the common description of this invention common to the technical-problem solution which was mentioned above according to a detailed examination of this invention persons was applied to the record using the ink which is easy to fix to the degree of pole, it became clear that the temperature fall of a certain amount of recording head concentrated on an injection field, and was seen. Although it does not usually change with a problem by record, if this is in the equipment which pursues the high level stability of a tint, and high definition, for example, cloth record, it serves as a technical problem which should be solved. This invention can solve this new technical problem, can respond also to increase of a certain amount of recovery conditions, and offers another purpose invention which can realize stable record, without reducing a recording characteristic.

[0013] (Outline of invention) If this inventions which solve each above-mentioned technical problem are enumerated, the following examples of representation can be given.

[0014] "The fluid injector characterized by having an injection means to inject a gas after injecting while being the fluid injector which injects a predetermined liquid using a fluid injection head and injecting a liquefied object to the fluid injection field of said fluid injection head or"

which is the main description of this invention can perform recovery efficiently, though it is a minimum configuration. That especially an important thing performs a gas injection for a liquefied object with injection increases compaction and the restorative effect of the recovery time, and it can also attain exclusion of fiber certainly. In this case, it is good preferably after liquefied object injection to perform a gas injection.

[0015] Next, although invention to mention adds recovery conditions more In the method of recovery of the ink jet record which records while moving relatively the record medium by which ink record is carried out with the record means equipped with the ink injection field which there is semantics important for this ranking and was equipped with two or more ink discharge parts It is the method of recovery for ink jet record characterized by having the 1st recovery process which injects a liquefied object and a gas to said ink injection field, and the 2nd recovery process which cleans said ink injection field in the direction which intersects the injection direction in said ink injection field after the 1st recovery process. This invention is effective to the concavo-convex front face which the removable residue is made to return to the efficient regular condition which is a short time, and was simply equipped especially with two or more injection section.

[0016] Next, it considers as invention which can also solve the newly found-out special technical problem with the recovery mentioned above. "It is in best mode of this invention. It has two or more ink discharge parts. In the method of recovery of the ink jet record which records while moving relatively the record medium by which ink record is carried out with the record means equipped with the ink injection field equipped with the electric thermal-conversion object which generates the heat energy for producing and cheating out of film boiling in the ink of each ink discharge part, and carrying out the regurgitation of the liquid The 1st recovery process which injects a liquefied object and a gas to said ink injection field, and the 2nd recovery process which cleans said ink injection field after the 1st recovery process, The method of recovery for ink jet record characterized by having the 3rd recovery process to which ink injection which drives said electric thermal-conversion object from said each of two or more ink discharge part, and is different from record after the 2nd recovery process is made to carry out" can be mentioned. While invention except the 2nd recovery process also solves the above-mentioned temperature fall efficiently among this invention, the poor ink object in an injection tip is eliminated, and a return in the more proper condition can be attained in a short time. In addition, as requirements for a configuration which solve the problem of the color mixture mentioned above, "the method of recovery for ink jet record characterize by hold said record means through predetermined spacing at the head electrode holder in said ink injection field which carry out the regurgitation of the different ink, respectively, and said 1st process inject said liquefied object and gas towards said head holder –" be add. Moreover, in the ink recording device which makes the cleaning direction by the cleaning member the direction where a liquefied object and a gas cross to the injection direction in the ink injection field injected by said ink injection field from another viewpoint, recovery of a head front face can be made more reliable.

[0017] An exception object is sufficient as it, respectively, and even when the injection tip of an injection means to inject a liquefied object and a gas is the same, it is good.

[0018] Moreover, it is sure that he can fully understand the purpose and effectiveness of each invention given in a claim from explanation of the background technique mentioned above.

[0019] High dependability can be maintained, when the clarification condition of the injection section of a fluid injection head is held over a long period of time, early image grace does not fall and record actuation continues any this invention for a long period of time.

[0020]

[Example] Hereafter, this invention is explained based on a drawing.

[0021] Drawing 1 shows the 1st example by the serial type of the ink jet recording device of this invention.

[0022] In drawing 1, carriage 1 carries recording head 2a for colors corresponding to four colors of cyanogen, a Magenta, yellow, and black, 2b, and 2c and 2d, and the guide shaft 3 is carrying out guidance support of the carriage 1 movable. The part is connected to carriage 1, and the belt 4 which is an endless belt drives carriage 1 so that it may move in the guide shaft 3 top along

with the recording surface of the record form 6 which are record media, such as paper, through a belt 4 with the drive motor 5 which is a pulse motor driven to Motor Driver 23. Furthermore, it has the conveyance roller 7 which conveys the record form 6, the guide rollers 8A and 8B to which it shows the record form 6, and the record form conveyance motor 9.

[0023] moreover, to each recording head 2a, 2b, and 2c and 2d The liquid route 10 which makes an ink droplet breathe out towards the record form 6 is formed, and a liquid route 10 is received. Each recording head 2a, 2b, ink tank 11a corresponding to 2c and 2d, As opposed to the regurgitation energy generation means (not shown) which ink was supplied through the supply tubes 12a, 12b, 12c, and 12d from 11b, 11c, and 11d, and was formed in each liquid route 10 An ink regurgitation signal is alternatively supplied through the flexible cables 13a, 13b, 13c, and 13d from each head drivers 24a, 24b, 24c, and 24d.

[0024] furthermore, to each recording head 2a, 2b, and 2c and 2d respectively — the head heaters 14a, 14b, 14c, and 14d (14b and 14c —) The temperature detection means 15a, 15b, 15c, and 15d are established. 14d — not illustrating — the detection signal from the temperature detection means 15a, 15b, 15c, and 15d It is inputted into the control circuit 16 which has CPU, and a control circuit 16 controls heating in the head heaters 14a, 14b, 14c, and 14d (not shown 14b, 14c, and 14d) through a driver 17 and a power source 18 based on this signal.

[0025] The capping means 20 is contacted by each recording head 2a, 2b, and the delivery side (2c and 2d) at the time of un-recording, and recording head 2a, 2b, and 2c and 2d move it to the capping means 20 and the location which counters at the time of un-recording. Then, by the cap driver 25, an advance drive is carried out, and the capping means 20 makes a delivery side carry out the pressure welding of the elastic member 44, and performs capping.

[0026] The blinding prevention means 31 receives regurgitation ink, when recording head 2a, 2b, and 2c and 2d carry out air ejecting actuation. This blinding prevention means 31 is equipped with the liquid receptacle member 32 as the liquid receiving section which meets recording head 2a, 2b, and 2c and 2d, and absorbs the ink by which air ejecting was carried out, and is arranged between the capping means 20 and the recording start location. In addition, as the quality of the material of the liquid receptacle member 32, a sponge-like porosity member or a plastics sintered compact is effective.

[0027] The solenoid valve 61 for water regurgitation and the air-pump driver 62 are connected with the capping means 20, and the regurgitation nozzle of the water for washing arranged in the bottom of control by the control circuit 16 in the capping means 20, respectively and the nozzle for injection of Ayr are driven for it.

[0028] Moreover, the expansion perspective view of the carriage section is shown in drawing 5 .

[0029] Drawing 4 is a top view for explaining actuation of the recording head of this example, the same sign is attached to the same element as what was shown in drawing 1 , and those explanation is omitted.

[0030] In drawing 4 , the recording start detection sensor 34 and the capping means detection sensor 36 detect that it attaches and is in a \*\*\*\* each recording head 2a, 2b, 2c, and capping location predetermined [ 2d ]. The air ejecting location detection sensor 35 detects the criteria location of the air ejecting actuation performed while recording head 2a, 2b, and 2c and 2d move to a scanning direction.

[0031] Next, actuation of an ink jet recording device is explained below.

[0032] First, waiting, capping of recording head 2a, 2b, and 2c and the 2d is carried out by the capping means 20, and if a print signal goes into a control circuit 16, carriage 1 will drive through Motor Driver 23. Next, it is detected by the air ejecting location detection sensor 35, and air ejecting of predetermined time amount ink is carried out to the blinding prevention means 31, and each liquid route (recording head 2a, 2b, and 2c and 2d) 10 drives alternatively from the recording start location detected by the recording start detection sensor 34, running in the direction of arrow-head D. Thereby, an ink droplet is breathed out and image recording is performed into the recording-width part P of the record form 6 by the dot-matrix pattern.

[0033] Then, as shown in drawing 4 , after sending recording head 2a, 2b, and 2c and 2d by P1 pulse from a recording start location by the drive motor 5 ( drawing 1 ) and printing an ink droplet in the record form 6, carriage 1 is moved to the location for P2 pulse, and record for one

scan is completed. After that, while reversing carriage 1, driving in the direction of arrow-head E and returning to an air ejecting location, as for the record form 6, the actuation in which only the width of face of the recording-width part P was conveyed in the direction of arrow-head F, and was again mentioned above is repeated.

[0034] In drawing 2, 450 covers the field (regurgitation side) in which the delivery of a recording head 101 was established, is the joinable cap section and has established it outside the record range by the recording head 101. 410 is a blower which supplies suction of the air from a platen 401, or air of cap section 450 HE. That is, this single blower 410 is used also [ source / of air supply / the source of air suction, and ].

[0035] 420 and 421 are change-over valves arranged between a blower 410, and a distributor 407 and the cap section 450, respectively. A change-over valve 420 switches a suction path to a distributor 407 or atmospheric-air side, at the time of record processing, it is carried out at a distributor 407 side, and a change setup of it is carried out at an atmospheric-air side at the time of cleaning of a regurgitation side. Moreover, a change-over valve 421 switches the supply path of air to a cap section 450 or atmospheric-air side, at the time of record processing, it is carried out at an atmospheric-air side, and a change setup of it is carried out at the cap section 450 side at the time of regurgitation side cleaning. 440 is the filter inserted between a change-over valve 421 and the cap section 450, and it prevents that the cap section 450 side HE installation of \*\*\*\*\*, the paper powder, etc. is carried out at the time of regurgitation side cleaning by the air supply of cap section HE. 451 is the nozzle for gas derivation prepared in the air supply path edge in the cap section 450, and is arranged according to the number of a recording head 101 in the suitable location to introduce a high-speed flow into each regurgitation side. For example, if three pieces are prepared according to the ink color which a recording head 101 uses (when an ink color is three pieces, Yellow Y, Magenta M, and Cyanogen C, etc.), it can prepare in each head 101 possible [ installation of a high-speed flow ] at the time of opposite with the cap section 450 of a recording head 101. Of course, when the effectiveness by injection of a high-speed flow is enough, it is not necessary to make it not necessarily correspond to a recording head and 1 to 1. However, when the color mixture of the ink from each recording head arises, it is desirable to prepare the nozzle for gas derivation for every recording heads which carry out the regurgitation of the liquid of each recording head or the same color. 457 is the nozzle which turns to a recording head liquids, such as water as washing material said by this invention, and injects them, to the nozzle 451 for gas derivation, corresponds 1 to 1 and is prepared.

[0036] Furthermore, in drawing 3, 331A and 331B are energization rollers which energize a record medium PP to main RO 1 RA and this, and constitute the lower conveyance roller 331 from these rollers, respectively. Moreover, similarly, 341A and 341B are a main roller and an energization roller, respectively, and constitute the up conveyance roller 341. Moreover, MI is a motor for driving the up conveyance roller 341. Drawing 2 shows the example of 1 configuration of the cap section 450, and joins it to the front face of a recording head 101, and it is formed in the configuration which can cover regurgitation side 101A. It is used for 452 acquiring the junction condition which are elastic members, such as rubber prepared in a part for a joint with recording head 101 front face, and does not have the relaxation and the clearance between impulse force at the time of junction. From edge 453A arranged in cap section "450 that 453 should engage with the lower part of the front face of a recording head 101 It is the ink absorber which made band-like extend until it resulted in the waste ink tank 455 besides the cap section 450. It supports with a spring 456 in the cap section 450, and at the time of junction of front-face HE of head 101 of the cap section 450, edge 453A displaces in the direction of arrow-head C, and it enables it to be certainly in contact with the engagement part of the front face of a head 101. Moreover, 454 is the ink absorber formed in the internal surface of the cap section 450.

[0037] As the quality of the material of an ink absorber, the thing of a class from which the volume does not change even if a macromolecule porous body is usable, and the volume change by absorption of ink Myst is not remarkable and absorbs ink like macromolecule foam, when using a macromolecule porous body is desirable, for example, can mention a foaming formal resin type

thing as a suitable thing.

[0038] Moreover, a glass burn join type macromolecule porous body can also be used as an ink absorber used here. For example, low density polyethylene, high density polyethylene, the amount polyethylene of giant molecules, Compound polyethylene, polypropylene, polymethylmethacrylate, Polystyrene, an acrylonitrile system copolymer, an ethylene-vinyl acetate copolymer, What could raise heat sintered compacts, such as a fluororesin and phenol resin, and used low density polyethylene, high density polyethylene, the amount polyethylene of giant molecules, and polypropylene from the absorptivity and ink-proof nature of ink Myst especially is desirable.

[0039] 445 is a tube which connects the nozzle 451 arranged in order to supply a high-speed flow from the upper part of regurgitation side 101A, and the filter 440 of the drawing 3 illustration. 101B is the nozzle section which has arranged two or more liquid flow channels to juxtaposition in the direction of a vertical, and has prepared regurgitation energy generation components, such as an electric thermal-conversion object. 101C is an ink room which supplies ink common to each liquid flow channel, and has connected the ink tank 110 through supply pipes 103 and 104. And a gear pump 105 is formed in one supply pipe 104, ink is fed in the ink supply system of recording head 101 HE on the occasion of regurgitation recoveries, such as removal processing of the ink which removal-processed [ of the air bubbles mixed in the inside of a supply way nozzle section 101B, etc. or \*\*\* ], and was thickened, and ink is made to discharge from a delivery. Uptake of the ink discharged by the regurgitation recovery by such ink feeding will be carried out by the ink absorber 453, and it will be led to a waste ink tank. Moreover, on the other hand, uptake of an ink droplet, \*\*\*, etc. which remained to the regurgitation side will be carried out to the ink absorber 453 by the cleaning processing by spraying of the air current from a nozzle 451. In addition, although not illustrated, it is made it not to be confused within the cap 450 in nothing and the air current from a nozzle 451 in relation to cleaning processing for that disconnection of the tooth back of the cap section 450 is possible.

[0040] In the example 1, the flow chart of drawing 7 showed the control procedure by the control circuit 16. This processing is started by preparing record data, and pressurization recovery of ink is first performed at step 1. At this time, recording heads 2a-2d are in a home position, and KYAPINGU is given by the capping means 20. A non-illustrated gear pump is driven in this condition, a recording heads [ 2a-2d ] ink supply path is pressurized, and ink is compulsorily discharged by recording heads 2a-2d. When air bubbles and dust are mixing in a nozzle by this, or when thickening of ink has arisen, these poor regurgitation factor is removed. And uptake of the discharged ink is carried out to an absorber 453.

[0041] This pressurization recovery is performed, and after carrying out predetermined time progress, it wipes with a damp towel in step S2. By opening the solenoid valve 61 for water regurgitation, wiping with a damp towel carries out the regurgitation of the water from a water nozzle to the delivery of each recording head. Consequently, viscosity falls by contact in water and adhering ink flows down with water. After the water which flowed down is absorbed by the absorber 453, it is incorporated in the waste ink tank 455.

[0042] Next, in step S3, the air-pump driver 62 is driven, a high-speed flow is wiped through an air jet hole on the delivery end face of a recording head, and head holder -19 front face, and cleaning by airstream is performed. The amount of Ayr spraying is made into 3.8 l/min - 4.5 l/min per recording head. After the waterdrop which had adhered to the recording head front face and head holder -19 front face by this high-speed flow flows down and being absorbed by the absorber 453, it is incorporated in the waste ink tank 455.

[0043] In step S4, the capping condition by the capping means 20 is canceled, in step S5, carriage 1 is driven to a main scanning direction, blades perform wiping of a delivery side and head holder -19 front face, and the waterdrop which remains on the delivery side and head holder -19 front face is removed. In addition, although the process by this step S5 is performed in preparation for the case where waterdrop should remain and is desirable processing, it is not indispensable in this invention.

[0044] Recording heads 2a-2d are moved to a main scanning direction, after detecting the basic

location of air ejecting actuation, a predetermined driving pulse is given to all the nozzles of a recording head, and the ink regurgitation is made to perform toward the liquid receptacle member 32 by the air ejecting detection sensor 35 in step S6 from all nozzles.

[0045] Next, in step S7, image data is outputted to recording heads 2a-2d, recording heads 2a-2d are driven, and image recording for one scan is performed. In step S8, when it is judged that it judged whether image recording was completed and ended, it shifts to step S9, and capping of the recording heads 2a-2d is carried out with a cap. On the other hand, in step S8, when continuing image recording, return and processing are repeated to step S2.

[0046] Next, in the example 2, the flow chart of drawing 8 showed the control procedure by the control circuit 16. That this processing differs from the processing in an example 1 is the point of spraying Ayr on coincidence, in case the water to recording heads 2a-2d and the head holder -19 is sprayed, as shown in step S12. Thereby, washing of the water breathed out from the water nozzle which the adhesion area to a recording heads [ 2a-2d ] delivery side and the front face of the head holder -19 becomes large in response to the effect of the air current of Ayr injected from the air jet hole, and is uniform is attained.

[0047] Then, in step S13, the air-pump driver 62 is driven, a high-speed flow is wiped through an air jet hole on a recording heads [ 2a-2d ] delivery end face and head holder -19 front face, and cleaning by airstream is performed. The following processes like an example 1.

[0048] Next, in the example 3, the flow chart of drawing 9 showed the control procedure by the control circuit 16. Although it performs wiping with a damp towel in step S2 to step S2 for every return and scan when it is judged that it continues image recording in step S8 in an example 1, it shifts to step S30 that this processing differs from the processing in an example 1, when it is judged that it continues image recording in step S28 in this example, and it judges whether horizontal scanning is the 50th time.

[0049] And when horizontal scanning is the 50th time, it shifts to step S21, and pressurization recovery of ink is performed. On the other hand, when horizontal scanning is not the 50th time, it shifts to step S25 and cleaning by blades is performed. By this, the count of down stream processing, such as wiping with a damp towel, can become fewer, the amount of the water used although minimum recovery is performed can be lessened, and chart lasting time can be shortened further.

[0050] Here, the regurgitation method of each recording head is the thing of the type which energizes at the nozzle heater fabricated inside each nozzle, is made to generate heat, and carries out the regurgitation of the ink with the energy (however, this invention is not restricted to it, and the same effectiveness can be acquired even if it is a piezo mold.).

[0051] The recovery unit means of this example has the following members and devices.

[0052] (a) Cap section : if long duration neglect of the recording head is carried out into air, the ink in a nozzle will evaporate and thicken and the regurgitation will become unstable. In order to prevent this, among un-printing, the nozzle section is intercepted with the open air and sealed (capping). There is an absorbent maintained at the damp or wet condition in ink in the interior of the cap section, the interior of the cap section is maintained to high humidity, and thickening of ink is suppressed to the minimum.

[0053] (b) Ink pressurization : in long duration neglect, even if it is carrying out capping, although it is slow, evaporate and thicken the ink in a nozzle. Moreover, there is not no barring the regurgitation remained and stabilized by air bubbles inside the nozzle, either. For this reason, the pump formed in the ink tank at the time of printing initiation was driven, ink pressurization was performed, and thickening ink and the residual air bubbles inside a nozzle are discharged out of a nozzle. This has the effectiveness which maintains the regurgitation which flushed them and was stabilized, even if dust and a fluff adhere to a nozzle front face or dust etc. has invaded in a nozzle.

[0054] (c) Liquefied object injection style : ease the condition of a fixing object and change into the condition which can be broken away [ balking or ]. It can act also to details.

[0055] (d) Gas-injection style : an impudence operation of the recovery of radiation effect of the fixing object changed into the condition which can be broken away, and a liquefied object can be attained, and perform exclusion from the head front face of the liquefied object itself where it

remained after the liquefied object injection style. Airstream is sprayed towards a nozzle front face from the air nozzle of the injection style cap upper part, and it blows to the recording head lower part. The absorbent (204 of drawing 10) is contacted by the lower part of each recording head, respectively, and the poured liquid is absorbed by this.

[0056] (e) Air ejecting : perform the temperature guarantee of a field which carried out the temperature fall by the liquefied object injection style and the gas-injection style, and the unnecessary object exclusion operation in an injection tip. A predetermined driving pulse is given and the ink regurgitation is made to perform toward the cap section etc. from all nozzles before printing initiation in addition to this (aging actuation). When raising the damp or wet condition of the circumference ambient atmosphere of a nozzle, it may carry out by carrying out capping.

[0057] The ink absorbed by the absorber by recovery action (c), (d), and (e) is sent to the waste ink bottle with which it was transmitted to the tube with the bottle and the recovery unit was prepared caudad.

[0058] (f) Blade unit : the regurgitation becomes [ that ink Myst generated by the ink regurgitation, and said softening fixing object or liquefied object has adhered to the nozzle front face and ] unstable as mentioned above. the blade unit equipped with the gummous blade for carrying out wiping of the nozzle front face, and cleaning it, in order to prevent this — the cap section — it has prepared next immediately. The ingredient uses silicon or polyurethane rubber from the field of endurance and ink-proof nature.

[0059] The tip of a blade has entered 0.7–1.0mm to the nozzle side of each recording head, and in fact, while a blade bends, respectively only in the part, wiping is made. Moreover, the die length of a blade is slightly shortened rather than the die length of opening of the holder for making a nozzle side express, respectively. Thereby, in case wiping of the nozzle top is carried out, a blade does not run aground to a head holder, therefore it wipes to a nozzle side, and remnants do not arise.

[0060] The factor which has a bad influence on regurgitation ink is completely removed from the above thing, and it becomes possible to maintain always good image grace. Furthermore, since it becomes possible to make each blade into minimum die length required for cleaning, the endurance improves. Even if degradation will arise and blades will moreover be exchanged, it is not necessary to carry out about all and is good at minimum exchange. There is also a merit that futility decreases by this and cost ends at a low price. Furthermore, although paper has explained as a record medium until now, this invention is applicable no matter it may be what thing, if record with an ink jet method is possible for cloth material on which width of face of 120cm and 160cm is recorded completely, such as for example, not only this but a film made from plastics, and a recording width 1m or more.

[0061] As a recording head of this example, by energizing on an electric thermal-conversion object, the configuration the ink on electric thermal-conversion dignity is heated, a foaming phenomenon generates, and a liquid ink drop carries out [ a configuration ] the regurgitation from a delivery side with the energy of the foaming is desirable, and it is the nozzle configuration of a nozzle consistency and high density, such as 16 nozzles / mm, and is good also as an ink jet recording head of a multi-nozzle called 128 nozzles or 256 nozzles.

[0062] Here, drawing 6 and 10 are explained briefly. Drawing 6 explains the structure of the recording head 2 (layered product of glass 82 and the aluminum substrate 83) equipped with the nozzle 81 to the head holder 19 mentioned above, and the taper section is formed in the aluminum substrate 83 for loading to the head holder 19. Therefore, the inclination (it is also puffed up in the inclination that a blade moves to the right from the left in this Fig.) for ink or a fixing object to be accumulated here is shown. If for the reason the liquefied object injection mentioned above also has surface tension if a fixing object is removed, the liquefied object itself may remain here and this is left, since paper powder and fiber will become easy to adhere, it is desirable to remove this. The gas injection after liquefied object injection can attain this. The broken line 85 shows the water-repellent-finish side.

[0063] There is drawing 10 in the example which added the configuration which performs the above-mentioned liquefied object injection and a gas injection to the non-injecting field between injection fields like a head holder. For a gas-injection means and 206, as for the gas injection

nozzle for injection fields, and 208, in this configuration, the liquefied object injection nozzle for injection fields and 207 are [ 200 / a liquefied object stowage and 201 / the gas injection nozzle for non-injecting fields and 209 ] the liquefied object injection nozzles for non-injecting fields. A gas injection nozzle is injected from back and has the composition that diffusion of the liquefied object of a flight condition can be attained from the liquefied object injection nozzle. Moreover, the diameter of opening of the liquefied object injection nozzle for non-injecting fields weakened the injection force of a non-injecting field as a result in response to the same larger pressure than the diameter of opening of the liquefied object injection nozzle for injection fields, and the unnecessary object has prevented entering all over an injection field. The problem of the color mixture mentioned above by this configuration is solvable. As for a head holder and 210, 202 is [ a blade cleaning member and 203 ] blades. Since this example is equipped with the injection side which inclined to the horizontal plane and there is, it has defined the injection location from the core of the injection section to the upper part section (although it changes also with numbers of nozzles, they are the 2-8th deliveries from a top). These configurations can attain efficient and positive recovery.

[0064] Next, the Records Department of the recording device for textile printing which can apply the fluid injector of this invention is hereafter explained with reference to a drawing.

[0065] Drawing 11 and drawing 12 are drawings showing the basic configuration of the ink jet recording device which records to a textile.

[0066] As this ink jet recording device is constituted as a system, is divided roughly and shown in drawing 11. The subject copy which the designer etc. created is read. It is based on the image-processing section 112 which incorporates and processes this subject-copy image into the subject-copy data changed into the subject-copy data expressed with an electrical signal from the image reader 111 and the image reader 111, and is outputted as an image data, and the image data \*\*\*\*\*<sup>(ed)</sup> image-processing section 112. It consists of the image recording sections 113 which record on record media, such as a textile.

[0067] In the image reader 111, a subject-copy image is read by CCD series.

[0068] In the image-processing section 112, since the ink jet Records Department A-2 (refer to drawing 12 ) which does the regurgitation of the ink of four colors of the Magenta (cable address M) mentioned later, cyanogen (cable address C), yellow (cable address Y), and black (cable address Bk) from the inputted subject-copy data is driven, data are created. In the case of creation of data, processing of the magnitude of patterns, such as an image processing for reproducing a subject-copy image by the dot of ink, a color scheme which determines a color tone, modification of a layout, expansion, and contraction, and selection are made.

[0069] Record is performed by the ink jet Records Department A-2 in the image recording section 113.

[0070] Drawing 12 is the mimetic diagram showing the outline of the image recording section of the recording device for textile printing shown in drawing 11 . This recording device is roughly divided, advances the grant section B which sends out record media, such as a roll-like textile to which pretreatment for textile printing was performed, and the sent record medium in a precision, and consists of the rolling-up section C which is made to dry the body section A which prints with an ink jet head, and the printed record medium, and is rolled round. And the body section A consists of the precision delivery section A-1 of a record medium and the ink jet Records Department A-2 which contain a platen further.

[0071] Actuation of this equipment is explained taking the case of the case where it prints hereafter using the record medium pretreated as a record medium.

[0072] The pretreated roll-like record medium 236 is sent out from the grant section B, and is sent to the body section. The thin endless belt 237 by which a step drive is carried out is constructed about in a driving roller 247 and the winding roller 249 at a precision at the body section. The step drive of the driving roller 247 is carried out with the stepping motor (not shown) of a high resolution at tie REKUTO, and only the amount of steps carries out the step feed of the belt. The sent cloth 236 is pushed and stuck on belt 237 front face backed up by the winding roller 249 with the forcing roller 240.

[0073] In 1st PURINTOBU 231, the record medium 236 carried out in the step feed with the belt

is orientated by the platen 232 on the front face of a belt, and is printed by the ink jet head 219 from a side front. Whenever the print of one line finishes, a specified quantity step feed is carried out and, subsequently heating by the heating plate 234 from a belt front face and the warm air from a front face supplied / discharged with the warm air duct 235 dry. Then, in 2nd print section 231', it piles up by the same approach as the 1st print section, and a print is made. [0074] It is lengthened and removed, and dries again by the same back dryer part 246 as the above-mentioned heating plate 234 and the warm air duct 235, and the record medium 236 which the print finished is led to the guide roll 241, is rolled round, and is rolled round by the roll 248. And the rolled-round record medium 236 is demounted from this equipment, and serves as a product through tail end processes, such as coloring, washing, and desiccation, by batch processing.

[0075] Next, the detail of the A-ink jet Records Department 2 neighborhood is explained based on drawing 13.

[0076] By the head of the 1st print section, a desirable mode here thins out the number of dots, records information, and it carries out the regurgitation of the ink droplet so that the information thinned out by the head of the 2nd print section in the 1st print section may be complemented through a desiccation process.

[0077] In drawing 13, the record medium 236 which is a record medium is stuck on a belt 237, and a step feed is carried out to above [ in drawing ]. There is the 1st carriage 244 which carried eight ink jet heads the special feature S1 besides Y.M.C.Bk – for S4 in the 1st print section 231 of the method of drawing Nakashita. What has used for ink what has the component which generates the heat energy which produces film boiling as energy used in order to carry out the regurgitation of the ink, and arranged the delivery of 128 by the consistency of 400dpi (dots per inch) is used for the ink jet head (recording head) 219 in this example.

[0078] The dryer part 245 which consists of a heating plate 234 heated from the rear face of a belt and a warm air duct 235 dried from a side front is formed in the downstream of the 1st print section. The heat transfer side of the heating plate 234 is pressed against the endless belt 237 to which the tension was able to be applied strongly, and heats a belt 237 powerfully from a rear face with the steam of elevated-temperature high pressure which it has let pass to the inside which has become in midair. A belt 237 heats directly the record medium 236 currently stuck effectively by heat conduction. Fin 234' for a collection of heat is prepared, and the inside of a heating plate side enables it to have concentrated heat on the belt rear face efficiently. The side which does not touch a belt is covered with the heat insulator 243, and has prevented loss by heat dissipation.

[0079] He applies air with more low humidity to the dried record medium 236, and is trying to raise effectiveness to it by spraying desiccation warm air from the supply duct 230 of the downstream on a side front. And when the air which flowed contrary to the conveyance direction of a record medium 236, and fully contained moisture carries out a lot of [ far ] suction than the amount of blasting from the suction duct 233 of the upstream, entrained moisture leaks and it is made to have not dewed a surrounding machinery. The source of supply of warm air is in a \*\*\*\* side in drawing 4, and it is made for the differential pressure of the diffuser 238 and the suction opening 239 which performed suction from this side left-hand side, and have countered the record medium 236 to be homogeneity over the longitudinal direction whole region. Blasting / suction section of air are offset by the downstream to the core of the heating plate 234 on the back, and it is made for air to have hit the fully heated place. The 1st print section 231 dries powerfully a lot of moisture in the ink also containing the thinner which the record medium 236 has received by these.

[0080] There is the 2nd print section 231' in the lower stream of a river (upper part), and the 2nd print section is formed by 2nd carriage 244' of the same configuration as the 1st carriage.

[0081] Next, the example of ink jet textile-printing record is explained. A record medium is dried after passing through an ink jet print process using an ink jet recording apparatus as shown in drawing 12 (an air drying is included). And the process which diffuses the color on record-medium fiber successingly, and carries out reaction fixing of the color to fiber is given. According to this process, sufficient color enhancement and the robustness by fixing of a color can be

acquired.

[0082] This diffusion and a reaction fixing process are conventionally good by the well-known approach, for example, the steaming method is mentioned. In addition, ant cull processing may be beforehand performed to a record medium in front of a print process in this case.

[0083] Then, in a tail end process, removal of the matter which used the unreacted color for removal and pretreatment is performed. Finally, record is completed through arrangement finishing processes, such as defective amendment and iron finishing.

[0084] Especially as a textile for ink jet textile printing, engine performance, such as that sufficient concentration may be made to color (1) ink, that the percentage exhaustion of (2) ink is high, that (3) ink dries promptly on a textile, that there is little generating of a blot of the irregular ink on (4) textiles, and excelling in the conveyance nature within (5) equipment, is required. In order to satisfy these military requirements, it can pretreat beforehand to a textile if needed. For example, the proposal of the textile which the textiles which have an ink absorbing layer in JP,62-53492,A are indicated [ textile ], and made a reduction inhibitor and the ant cull matter own in part in JP,3-46589,B is made. The processing which it is chosen [ processing ] as a textile out of an alkaline substance, a water soluble polymer, synthetic macromolecule, a water-soluble metal salt, a urea, and thiourea, and makes the \*\*\* matter contain as an example of such pretreatment can be mentioned.

[0085] As an alkaline substance, carbonic acid, such as amines, such as hydroxylation alkali metal, such as a sodium hydroxide and a potassium hydroxide, monochrome, JI, and triethanolamine, a sodium carbonate, potassium carbonate, and sodium bicarbonate, or a heavy carbonic acid alkali-metal salt is mentioned, for example. Furthermore, there are organic-acid metal salts, ARUMONIA, ammonium compounds, such as calcium acetate and barium acetate, etc. Moreover, the sodium trichloroacetate which serves as ARUKARU matter under steaming and dry heat can be used. As a desirable alkaline substance, there are the sodium carbonate and sodium bicarbonate which are used for dyeing of reactive dye especially.

[0086] As a water soluble polymer, natural water solubility macromolecules, such as protein matter, such as polysaccharide, such as cellulose system matter, such as starch matter, such as corn and wheat, a carboxymethyl cellulose, methyl cellulose, and hydroxyethyl cellulose, sodium alginate, gum arabic, low KASUITO bean gum, tragacanth gum, Cyamoposis Gum, and a tamarind seed, gelatin, and casein, tannin system matter, and lignin system matter, are mentioned.

[0087] Moreover, as synthetic macromolecule, a polyvinyl alcohol system compound, a polyethylene oxide system compound, an acrylic-acid system water soluble polymer, a maleic-anhydride system water soluble polymer, etc. are mentioned, for example. A polysaccharide system macromolecule and a cellulose system macromolecule are desirable also in these.

[0088] As a water-soluble metal salt, for example like the halogenide of alkali metal and alkaline earth metal, typical ionic crystal is made and the compound which is pH 4-10 is mentioned. as the typical example of this compound — alkali metal — NaCl and Na<sub>2</sub>SO<sub>4</sub>, KCl, CH<sub>3</sub>COONa, etc. are mentioned, and CaCl<sub>2</sub> and MgCl<sub>2</sub> grade are mentioned as an alkaline earth metal. The salts of Na, K, and calcium are desirable especially.

[0089] Although especially the method of making a textile contain the steamy matter etc. in pretreatment is not restricted, it can mention the dip coating usually performed, the pad method, a coating method, a spray method, etc.

[0090] Furthermore, since the textile-printing ink given to the textile for ink jet textile printing has only adhered in the condition of having given on the textile, it is desirable to give the reaction fixing process (dyeing process) of the color to fiber successively. A conventionally well-known approach is sufficient as such a reaction fixing process, for example, when not using the steaming method, the HT steaming method, the thermostat fixing method, and the textile that carried out alkali treatment beforehand, the alkali pad steam method, the alkali blotch steam method, an alkali shock procedure, the alkali cold fixing method, etc. are mentioned.

[0091] According to a well-known approach, washing can perform conventionally removal of the matter used for removal and pretreatment of a still more nearly unreacted color after the above-mentioned reaction fixing process. In addition, it is desirable to use well-known fix processing together conventionally in the case of this washing.

[0092] In addition, the record object with which the tail end process described above was given is separated by desired magnitude after that, a process for the separated piece to obtain final workpieces, such as attaching by sewing, adhesion, and joining, is given, and clothing and quilt covers, such as a dress, DRESS, a necktie, and a swimming suit, sofa covering, a handkerchief, a curtain, etc. are obtained. many approaches of processing a textile by sewing etc. and using as clothing or other daily necessities are indicated by well-known documents, such as for example, "manual made from newest Nitto":SENI journal company issue, and monthly "\*\*\*\*":culture publication station issue.

[0093] Especially, this invention forms a flight-drop also in an ink jet recording method using heat energy, and brings about the effectiveness which was excellent in the recording head of the ink jet method which records, and the recording device.

[0094] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports recording information and exceeds nucleate boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instancy, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable.

[0095] As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0096] The configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of a delivery which is indicated by each above-mentioned specification, a liquid route, and an electric thermal-conversion object is crooked as a configuration of a recording head is also included in this invention.

[0097] Furthermore, although any of the configuration which fills the die length with the combination of two or more recording heads which are indicated by the specification mentioned above as a recording head of the full line type which has the die length corresponding to the width of face of the maximum record medium which can record a recording device, and the configuration as one recording head formed in one are sufficient, this invention can demonstrate the effectiveness mentioned above much more effectively.

[0098] In addition, this invention is effective also when the recording head of the exchangeable chip type with which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained, or the recording head of the cartridge type with which the ink tank was formed in the recording head itself in one is used by the body of equipment being equipped.

[0099] Moreover, since the effectiveness of this invention can be stabilized further, it is desirable to add the recovery means against a recording head established as a configuration of the recording device of this invention, a preliminary auxiliary means, etc. If these are mentioned concretely, it is effective in order to perform record stabilized by performing the preheating means by the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination

over a recording head, and reserve regurgitation mode in which the regurgitation different from record is performed.

[0100] Furthermore, as a recording mode of a recording device, not only a recording mode but a recording head is constituted only for mainstream colors, such as black, in one, or although it is good even by combination in plurality, this invention is very effective also in equipment equipped with full color at least one by the double color color of a different color, or color mixture.

[0101] In this invention example explained above, although ink is explained as a liquid The thing which is ink solidified less than [ a room temperature or it ], and is softened at a room temperature, or the thing which is a liquid, Or by the above-mentioned ink jet method, since what carries out temperature control is common as a temperature control is performed for ink itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stabilization regurgitation range about the viscosity of ink, ink should just make the shape of liquid at the time of use record signal grant. In addition, it carries out whether the ink which prevents by making the temperature up by heat energy use it positively as energy of the change of state from a solid condition to the liquid condition of ink, or is solidified in the state of neglect for the purpose of antiflashing of ink is used. Anyway, ink liquefies by grant according to the record signal of heat energy. Use of the ink of the property which will not be liquefied without heat energy, such as what carries out the regurgitation as liquefied ink, and a thing which it already begins to solidify when reaching a record medium, is also applicable to this invention.

[0102] Furthermore, in addition, as a gestalt of the recording device concerning this invention, although prepared in one or another object as an image printing terminal of information management systems, such as a word processor and a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0103]

[Effect of the Invention] Even if it can prevent generating of the cause which becomes faulty [ images, such as color mixture, ] if according to this invention recovery of the fluid injection field of a fluid injection head can be attained certainly and efficiently, a new technical problem can be solved proper and it is in a recording device as explained above, and it faces prolonged use, high-definition record can be performed.

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[Translation done.]

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] The whole example perspective view

[Drawing 2] The head of an example, the expanded sectional view of the recovery device section

[Drawing 3] Suction conveyance of an example, and the mimetic diagram of the recovery device section

[Drawing 4] The plan of the recovery device section to the head successive range of drawing 1

[Drawing 5] The perspective view showing the condition of the cleaning member of an example, and a head

[Drawing 6] The sectional view showing the head location to the head holder of this invention

[Drawing 7] The flow chart of this invention example 1

[Drawing 8] The flow chart of this invention example 2

[Drawing 9] The flow chart of this invention example 3

[Drawing 10] The important section perspective view of an example including recovery of the non-injecting field of this invention

[Drawing 11] Drawing showing the ink jet record structure of a system after reading an image until it records

[Drawing 12] The schematic diagram of the recording device for textile printing with which this invention is applied

[Drawing 13] The mimetic diagram showing the outline of the image recording section of the recording device for textile printing shown in drawing 12

**[Description of Notations]**

200 Liquefied Object Stowage

201 Gas-Injection Means

206 Liquefied Object Injection Nozzle for Injection Fields

207 Gas Injection Nozzle for Injection Fields

208 Gas Injection Nozzle for Non-Injecting Fields

209 Liquefied Object Injection Nozzle for Non-Injecting Fields

202 Head Holder

210 Blade Cleaning Member

203 Blade

204 Absorption Member

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The ink jet head which can carry out the regurgitation of the drop, and the air booster pump which pressurizes air, It is the ink jet recording apparatus which has the ink cartridge which supplied ink to said ink jet head, and was installed in it removable. Said ink cartridge It is divided into the large ink room and the small ink room, and has at least one hole which opens said small ink room and said large ink room for free passage. When the hole possesses the means which prevents ink from flowing backwards in the large ink room from the small ink room, and the air hole which is open for free passage with atmospheric air in said large ink room is provided and it is equipped with said ink cartridge, Said air booster pump and ink jet head are an ink jet recording device characterized by being open for free passage in said small ink room.

[Claim 2] An ink jet head is an ink jet recording device according to claim 1 which is an ink JIEETO head equipped with two or more deliveries full line type covering full [ of the record region of a record medium ].

[Claim 3] An ink jet head is an ink jet recording device according to claim 1 or 2 which has the electric thermal-conversion object as a means to make ink breathe out from a delivery using heat energy, and to generate heat energy.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to an ink jet recording apparatus equipped with the pressurization recovery device which the ink supply system which supplies ink to especially an ink jet head (recording head) pressurizes [ recovery device ] ink at the time of the blinding of the head by desiccation of ink, dust \*\*\*\*\* etc., and recovers a function about an ink jet recording apparatus.

[0002]

[Description of the Prior Art] The case where non-printing time amount is long and the ink in a nozzle dries in an ink jet recording device, When the regurgitation of ink becomes impossible by mixing of impurities, such as dust, or the bubble to the liquid ink interior of a room etc., Recovery action called pressurization recovery of pressing ink with a pump, extruding the ink in a nozzle, and recovering a function, or the suction recovery which is made to stick a cap to the nozzle section, makes the inside of a cap negative pressure with a pump etc., and sucks out ink is performed.

[0003] Among these, in pressurization recovery, the plunger (piston) pump, a gear pump, a turbine pump, etc. are conventionally used as a pump. A pump pressurizes air with the thing (henceforth a direct pressurization method) of the method pressurized directly, and, as for these pumps, ink is divided [ be / it / under / of the pump itself / passing / the air ] into the thing (henceforth an indirect pressurization method) of the method which pressurizes ink for ink.

[0004] Conventionally, the pump of a direct pressurization method was formed between the ink tank (cartridge) and the head in many cases, and the thing of an indirect pressurization method had many which are directly tied to the sealed ink tank (cartridge), pressurize the air in the ink tank, and extrude ink.

[0005]

[Problem(s) to be Solved by the Invention] However, when the pressure of the bubble generated by heating a heater with a heater to a nozzle and its interior performs pressurization recovery action in the head to which the nozzle for carrying out the regurgitation of the ink like the method which carries out the regurgitation of the ink is located in a line with high density, There was a fault of being easy to carry out blinding of the filter which is between a nozzle, a nozzle, and an ink tank with the dust out of which the pump came from the sliding section of a pump in long-term use in the thing of a direct pressurization method located between an ink tank and a head.

[0006] Moreover, when the amount of ink decreases in the thing of the indirect pressurization method which pressurizes the sealed ink tank, in order for the volume of air to increase and to pressurize in a tank, when predetermined air was sent in, there was a fault that do not take time amount until a predetermined pressure is applied to ink, and a pressure did not rise to an early pressure.

[0007] In case the purpose of this invention performs pressurization recovery of an ink jet head, it is to offer the ink jet recording device which can be pressurized efficiently, without taking out dust.

[0008]

[Means for Solving the Problem] The ink jet head which can carry out the regurgitation of the drop in order that this invention may solve the above-mentioned fault, The air booster pump which pressurizes air, and the ink cartridge which supplied ink to said ink jet head, and was installed in it removable, It is the ink jet recording apparatus which \*\*\*. Said ink cartridge It is divided into the large ink room and the small ink room, and has at least one hole which opens said small ink room and said large ink room for free passage. When the hole possesses the means which prevents ink from flowing backwards in the large ink room from the small ink room, and the air hole which is open for free passage with atmospheric air in said large ink room is provided and it is equipped with said ink cartridge, Said air booster pump and ink jet head are open for free passage in said small ink room.

[0009]

[Function] According to this invention, since the ink room where the volume is small is pressurized, it can pressurize efficiently. Moreover, since it is the method pressurized with air, dust does not go into ink and a head does not carry out blinding to long-term use. Furthermore, since it is a cartridge type, ink exchange when ink is lost is also easy.

[0010]

[Example] Drawing 1 is the schematic diagram of the ink supply system of the 1st example which carried out this invention.

[0011] The ink jet head to which 1 carries out the regurgitation of the ink in drawing 1 according to an electrical signal, 2 an ink cartridge and 4 for an air booster pump and 3 The small ink room in an ink cartridge 3, While the air hole in which 5 was prepared in the large ink room in an ink cartridge 3, and 6 was prepared above the large ink room 5, and 7 are prepared between the small ink room 4 and the large ink room 5 and opening the small ink room 4 and the large ink room 5 for free passage The valve system which prevents ink flowing backwards in the large ink room 5 from the small ink room 4, 8 connects ink and 9 connects an ink cartridge 3 with the ink jet head 1. Even if a needle takes out and inserts the tube along which the tube along which ink passes in inside, and 10 connect the air booster pump 2 and an ink cartridge 3, and air passes in inside, the needle with which, as for 11, inside became in midair, and 12 like chlorinated butyl rubber, they are rubber sealing which can maintain airtightness.

[0012] Drawing 2 (a) and (b) are the schematic diagrams of the air booster pump 2.

[0013] As for a washer for a piston 21 not to escape from the valve with which a shaft for free passage opening which opened 21 to the piston and opened 22 to the piston 21, and 23 to move a piston 21, and 24 close the free passage opening 22 only when a piston is pushed on the tap hole 27 side of a cylinder, and 25 from a shaft 23, and 26, in drawing 2 , the tap hole of a cylinder and 27 are the atmospheric-air disconnection sides of a cylinder.

[0014] First, recovery action is performed in order to ensure the regurgitation of the ink from a head as preparation of a print, if the power source of the body of a printer is switched on. Then, the shaft 23 which suited atmospheric-air disconnection side 27 of the air booster pump 2 is driven by a non-illustrated motor etc., and is moved in the direction of A ( drawing 2 (a)). Since it is compressed while the free passage opening 22 is closed by the valve 24 at this time, the air in the air booster pump 2 is pressurized. The pressurized air pressurizes the small ink room 4 through a tube 10. If the small ink room 4 is pressurized, a valve system 7 will work, it will be in a sealing condition, and ink will be extruded to the ink jet head 1, and dry ink, dust, etc. in a nozzle are discharged besides a nozzle. As compared with the large ink room 5, since the small ink room 4 is fully small, even if its capacity of an air booster pump is not so large, it can fully raise the pneumatic pressure of the small ink room 4, and can pressurize ink efficiently.

[0015] Next, if the piston 21 in the air booster pump 2 begins to move to an expansion side (the direction of B of drawing 2 (b)), an opening will open between a valve 24 and the free passage opening 22, and the air section in the small ink room 4 will be opened for free passage with atmospheric air. At this time, since the air hole 6 is open in the large ink room 5, the small ink room 4 and the large ink room 5 will be wide opened by atmospheric air, and ink flows into the small ink room 4 from the large ink room 5 through a valve system 7 until the oil level of ink becomes the same.

[0016] Thus, if ink is consumed, air increases in the ink cartridge gradually, but since there is little absolute magnitude of the air in the den even if ink decreases in number when it is made the structure which pressurizes the room where the volume is small like this example, it can pressurize efficiently. The above-mentioned recovery action is good in a line at any time, not only when no electric power switches are switched on, but when printing grace falls.

[0017] In addition, although it is the air hole 6 in the large ink room 5, this may be made the configuration opened by a non-illustrated cam etc. when it is attached in a body, although it blockades at the time of ink cartridge 3 simple substance.

[0018] Drawing 5 is the appearance perspective view showing an example of the ink jet recording device (IJRA) with which it equipped as an ink jet head cartridge (IJC) equipped with the device for the above-mentioned recovery action.

[0019] In drawing, 120 is the ink jet head cartridge (IJC) equipped with the nozzle group which counters the recording surface of the detail paper by which paper feed has been carried out on a platen 124, and performs the ink regurgitation. 116 is the carriage HC holding IJC120, and the both-way migration of it covering full [ of the recording paper of IJC120 ] is attained by connecting with some driving belts 118 which transmit the driving force of a drive motor 117, and enabling two guide shafts 119A and 119B each other arranged in parallel and sliding.

[0020] 126 is a head and is arranged in the end of the moving trucking of IJC120, for example, a home position, and the location which counters. With the driving force of the motor 122 through a driving mechanism 123, the head recovery device 126 is made to operate and capping of IJC120 is performed. It is made to relate to capping to IJC120 by cap section 126A of this head recovery device 126, ink feeding by the proper pressurization means formed in ink suction by the proper suction means established in the head recovery device 126 or the ink supply path to IJC120 is performed, and regurgitation recovery of removing the thickening ink in a nozzle is performed by making ink discharge more compulsorily than a delivery. Moreover, IJC is protected by performing capping at the time of record termination etc.

[0021] 130 is a blade as a wiping member which is arranged in the side face of the head recovery device 126, and is formed by silicone rubber. A blade 130 is held with a cantilever gestalt at blade attachment component 130A, like the head recovery device 126, it operates by the motor 122 and the transmission function 123, and engagement to the regurgitation side of IJC120 of it is attained. By this, are the suitable timing in record actuation of IJC120, or a blade 130 is made to project in the moving trucking of IJC120 after the regurgitation recovery using the head recovery device 126, and it is the thing [ in / in connection with migration actuation of IJC120 / the regurgitation side of IJC120 ] which dews, gets wet or wipes off dust etc.

[0022] Drawing 3 is the schematic diagram of the 2nd example which carried out this invention.

[0023] This is a 4 \*\*\* poor thing about the ink supply system of drawing 1, it prepares yellow, a Magenta, cyanogen, and the ink jet head of each color of black \*\*, carries out to color record, and sets a pump to one further. In this case, the source of power is also set to one and an expensive pump is good that the cost is cut down at one. Other configurations and effectiveness are completely the same as the 1st example.

[0024] Drawing 4 is the schematic diagram of the 3rd example which carried out this invention.

[0025] This can be made to perform extraction and insertion of the ink cartridge of the 1st example not a longitudinal direction but from the upper and lower sides. The needle 12 by the side of air is long as compared with the needle 12 by the side of ink, and projects more nearly up than the oil level of ink 8. This is carried out to 4 \*\*\*\*\* color record, and it is good as for one in an air booster pump like the 2nd example. Other configurations and effectiveness are completely the same as the 1st example.

[0026] Especially, also in an ink jet recording method, this invention forms a flight drop using heat energy, and brings about the outstanding effectiveness in the recording head of the ink jet recording method which records, and a recording device. About the typical configuration and typical principle, for example, it is indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, and, as for this invention, what is performed using these fundamental principles is desirable. This recording method is applicable to both the so-called mold on demand and a continuous system. When this recording method is explained briefly, heat energy is made

to generate and the heat operating surface of a recording head is made to produce film boiling by exceeding a nucleate-boiling phenomenon into a liquid (ink) corresponding to recording information, and impressing at least one driving signal for giving a rapid temperature rise which produces a film-boiling phenomenon to the electric thermal-conversion object arranged corresponding to the sheet and liquid route where the liquid (ink) is held. Thus, for a forming [the air bubbles which carried out the one to one correspondence to the driving signal given to an electric thermal-conversion object from a liquid (ink)] reason, it is especially effective in the method of recording a mold on demand. A liquid (ink) is made to breathe out through a discharge opening by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instance, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0027] A thing with the configuration arranged to the field to which the heat operation section is crooked is also contained in this invention as indicated by the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification other than a configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of having combined a discharge opening which is indicated by each above-mentioned specification, the liquid flow channel, and the electric thermal-conversion object as a configuration of a recording head. In addition, also in the configuration based on the Provisional-Publication-No. 59 No. 138461 official report per year which indicates the configuration whose puncturing which absorbs the pressure wave of the Provisional-Publication-No. 59 No. 123670 official report per year which indicates the configuration which uses a common slit as the discharge opening of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part, this invention is effective.

[0028] Furthermore, as a recording head for which this invention is used effectively, there is a full line type recording head of the die length corresponding to the maximum width of the record medium which can record a recording device. This full line head may be what carried out the full line configuration, and a full line recording head of a piece formed in one by combining two or more recording heads which are indicated by the specification mentioned above.

[0029] In addition, this invention is effective also when the recording head of the exchangeable chip type with which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained, or the recording head of the cartridge type formed in the recording head itself in one is used by the body of equipment being equipped.

[0030] Moreover, since the recording device of this invention can be further made stability, it is desirable to add the recovery means against a recording head, a preliminary auxiliary means, etc. to the recording device of this invention. If these are mentioned concretely, it is effective in order to perform record stabilized by adding the preheating means by the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a recording head, and a means to perform reserve regurgitation mode in which the regurgitation different from record is performed.

[0031] Furthermore, although any of what constituted not only the mode that records only mainstream colors, such as black, as a recording mode of a recording device but the recording head combining what was constituted in one, and plurality are sufficient, this invention is very effective also in equipment equipped with full color at least one by the double color color or color mixture of a different color.

[0032] In this invention example explained above, although explained using liquid ink, even if it is ink which will be in a softening condition at a room temperature even if it is ink which is a solid-state-like at a room temperature, it can use by this invention. With above-mentioned ink jet equipment, since what carries out temperature control is common as a temperature control is

performed for ink itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stabilization regurgitation range about the viscosity of ink, ink should just make the shape of liquid at the time of use record signal grant.

[0033] In addition, the ink which prevents positively by making the superfluous temperature up of the head by heat energy or ink use it as energy of the change of state from a solid condition to the liquid condition of ink, or is solidified in the state of neglect for the purpose of antiflashing of ink can also be used. Anyway, when reaching the thing and record medium which ink liquefies and carry out the regurgitation as the shape of liquid ink by grant according to the record signal of heat energy, use of ink with the property which will not be liquefied without grant of heat energy, such as what it is already begun to solidify, is also applicable to this invention.

[0034] Such ink is good for a porosity sheet crevice or a through tube which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as a solid.

[0035] In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0036]

[Effect of the Invention] As explained above, even if the ink in an ink cartridge decreases in number and the volume of air increases by pressurizing the inside of an ink cartridge by the air booster pump in a break and the room of the smaller one at the den of two size according to this invention, it is effective in the ability to pressurize ink efficiently. Moreover, since it pressurizes with air, dust does not come out, either.

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[Translation done.]

**\* NOTICES \***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] The schematic diagram of the 1st example which carried out this invention.

[Drawing 2] (a) and (b) are the schematic diagram of the air booster pump of the 1st example which carried out this invention.

[Drawing 3] The schematic diagram of the 2nd example which carried out this invention.

[Drawing 4] The schematic diagram of the 3rd example which carried out this invention.

[Drawing 5] The appearance perspective view showing an example possessing the ink supply system obtained by this invention of an ink jet recording device.

**[Description of Notations]**

- 1 Ink Jet Head
- 2 Air Booster Pump
- 3 Ink Cartridge
- 4 Small Ink Room
- 5 Large Ink Room
- 6 Air Hole
- 7 Valve System
- 8 Ink
- 9 Ink Tube
- 10 Ayr Tube
- 11 Hollow Needle
- 12 Rubber Sealing
- 21 Piston
- 22 Free Passage Opening
- 23 Shaft
- 24 Valve
- 25 Washer
- 26 Tap Hole of Cylinder
- 27 Atmospheric-Air Disconnection Side of Cylinder

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**[Translation done.]**

# PATENT ABSTRACTS OF JAPAN

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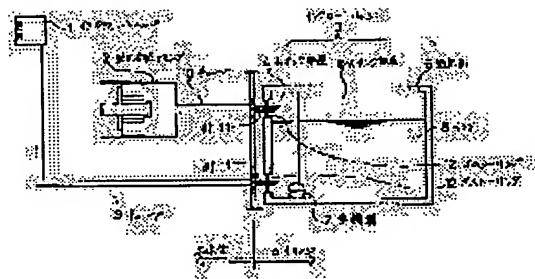
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## (54) INK JET RECORDER

### (57)Abstract:

**PURPOSE:** To enable an ink jet head to be effectively pressurized without generating dust when the ink jet head is recovered to be pressurized.

**CONSTITUTION:** An ink cartridge 3 is divided into a large ink chamber 5 and a small ink chamber 4. The small ink chamber 4 is interconnected to the large ink chamber 5. Besides, a valve mechanism 7 which prevents ink from flowing backward from the small ink chamber 4 to the large ink chamber 5 is provided. Further, the large ink chamber 5 is equipped with an air vent which is interconnected to the open air. When the ink cartridge 3 is installed, an air pressurizing pump 2 and an ink jet head 1 are interconnected to the small ink chamber 4.



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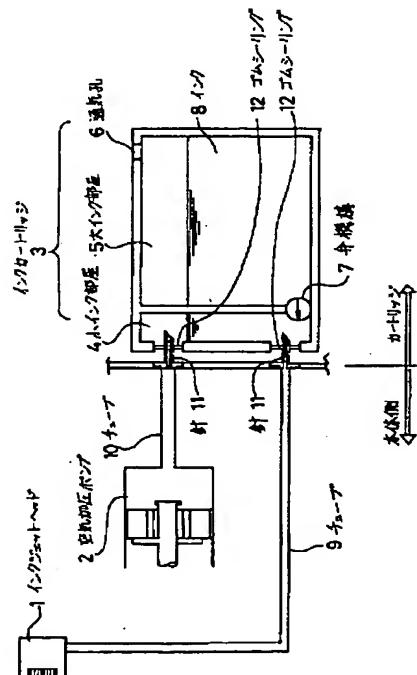
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(54)【発明の名称】 インクジェット記録装置

(57)【要約】

【目的】 インクジェットヘッドの加圧回復を行う際、ゴミを出さずに効率よく加圧する。

【構成】 インクカートリッジ3は、大インク部屋5と小インク部屋4に分割され、小インク部屋4と大インク部屋5を連通すると共に、インクが小インク部屋4から大インク部屋5に逆流するのを防ぐ弁機構7を持ち、また、大インク部屋5には大気と連通する通気孔を具備し、インクカートリッジ3が装着されたとき、空気加圧ポンプ2とインクジェットヘッド1は小インク部屋4に連通する。



(カートリッジ)に直接つなげられそのインクタンク内の空気を加圧してインクを押し出すものが多かった。

**【0005】**

【発明が解決しようとしている課題】しかしながら、ノズルとその内部にヒータを持ちヒータを加熱することにより発生する泡の圧力によってインクを吐出する方式のようにインクを吐出するためのノズルが高密度に並ぶヘッドにおいて加圧回復動作を行う場合、ポンプがインクタンクとヘッドの間に位置する直接加圧方式のものにおいては、長期の使用においてポンプの摺動部より出たゴミによりノズルやノズルとインクタンクの間にあるフィルターが目詰まりしやすいという欠点があった。

- 10 【0006】また、密閉されたインクタンクを加圧する間接加圧方式のものにおいてインクの量が減少したとき、タンク内には空気の容積が多くなり、加圧するため所定の空気を送り込んだときに、インクに所定の圧力がかかるまで時間がかかったり、また初期の圧力まで圧力が上昇しないという欠点があった。

- 20 【0007】本発明の目的は、インクジェットヘッドの加圧回復を行う際、ゴミを出さずに効率よく加圧することができるインクジェット記録装置を提供することにある。

**【0008】**

【課題を解決するための手段】本発明は上記の欠点を解決するために、液滴を吐出することのできるインクジェットヘッドと、空気を加圧する空気加圧ポンプと、前記インクジェットヘッドにインクを供給し着脱可能に設置されたインクカートリッジと、を有するインクジェット記録装置であって、前記インクカートリッジは、大インク部屋と小インク部屋に分割され、前記小インク部屋と前記大インク部屋を連通する穴を少なくとも一つ持ち、その穴はインクが小インク部屋から大インク部屋に逆流するのを妨げる手段を具備し、また、前記大インク部屋には大気と連通する通気孔を具備し、前記インクカートリッジが装着されたとき、前記空気加圧ポンプとインクジェットヘッドは前記小インク部屋に連通することを特徴とするインクジェット記録装置。

- 30 【0009】  
【作用】本発明によれば、容積が小さいインク部屋を加圧するので効率よく加圧できる。また、空気で加圧する方式であるのでインクにゴミが入らず長期の使用に対してヘッドが目詰まりしない。さらに、カートリッジ方式なのでインクがなくなったときのインク交換も容易である。

**【0010】**

- 【実施例】図1は本発明を実施した第1の実施例のインク供給系の概略図である。  
【0011】図1において、1は電気信号に応じてインクを吐出するインクジェットヘッド、2は空気加圧ポンプ、3はインクカートリッジ、4はインクカートリッジ3内の小インク部屋、5はインクカートリッジ3内の大

**【特許請求の範囲】**

【請求項1】 液滴を吐出することのできるインクジェットヘッドと、空気を加圧する空気加圧ポンプと、前記インクジェットヘッドにインクを供給し着脱可能に設置されたインクカートリッジと、を有するインクジェット記録装置であって、前記インクカートリッジは、大インク部屋と小インク部屋に分割され、前記小インク部屋と前記大インク部屋を連通する穴を少なくとも一つ持ち、その穴はインクが小インク部屋から大インク部屋に逆流するのを妨げる手段を具備し、また、前記大インク部屋には大気と連通する通気孔を具備し、前記インクカートリッジが装着されたとき、前記空気加圧ポンプとインクジェットヘッドは前記小インク部屋に連通することを特徴とするインクジェット記録装置。

【請求項2】 インクジェットヘッドは、記録媒体の記録域の全幅にわたって、複数の吐出口を備えているフルラインタイプのインクジェットヘッドである請求項1記載のインクジェット記録装置。

【請求項3】 インクジェットヘッドは、熱エネルギーを利用して吐出口からインクを吐出させるもので、熱エネルギーを発生させる手段として電気熱変換体を有している請求項1または2記載のインクジェット記録装置。

**【発明の詳細な説明】**

**【0001】**

【産業上の利用分野】本発明はインクジェット記録装置に関するものであり、特にインクジェットヘッド(記録ヘッド)にインクを供給するインク供給系が、インクの乾燥やゴミづまり等によるヘッドの目詰まり時にインクを加圧して機能を回復させる加圧回復装置を備えているインクジェット記録装置に関する。

**【0002】**

【従来の技術】インクジェット記録装置において、非印字時間が長くノズル内のインクが乾燥した場合や、ゴミ等の不純物あるいはインク液室内への泡の混入等によりインクの吐出が不能になった場合、ポンプによりインクを押圧しノズル内のインクを押し出して機能を回復させるとの加圧回復、またはノズル部にキャップを密着させポンプ等によりキャップ内を負圧にしてインクを吸い出す吸引回復という回復動作が行われている。

【0003】このうち加圧回復において従来、ポンプとしてプランジャー(ピストン)ポンプやギヤポンプ、ターピンポンプ等が用いられている。これらのポンプは、インクがポンプ自体の中を通ってインクが直接加圧される方式のもの(以下、直接加圧方式という)と、ポンプが空気を加圧してその空気がインクを加圧する方式のもの(以下、間接加圧方式という)とに分けられる。

【0004】従来、直接加圧方式のポンプはインクタンク(カートリッジ)とヘッドとの間に設けられることが多く、間接加圧方式のものは、密閉されたインクタンク

インク部屋、6は大インク部屋5の上方に設けられた通気孔、7は小インク部屋4と大インク部屋5との間に設けられ、小インク部屋4と大インク部屋5を連通すると共に、インクが小インク部屋4から大インク部屋5に逆流するのを防ぐ弁機構、8はインク、9はインクジェットヘッド1とインクカートリッジ3を接続し、中にインクが通るチューブ、10は空気加圧ポンプ2とインクカートリッジ3とを接続し、中に空気が通るチューブ、11は中が中空になった針、12は例えば塩素化ブチルゴムのように針が抜き差しされても気密性を保つことできるゴムシーリングである。

【0012】図2(a), (b)は空気加圧ポンプ2の概略図である。

【0013】図2において、21はピストン、22はピストン21に開いた連通口、23はピストン21を動かすための軸、24はピストンがシリンダーの流出口27側に押されるときのみ連通口22を塞ぐ弁、25はピストン21が軸23から抜けないためのワッシャ、26はシリンダーの流出口、27はシリンダーの大気開放側である。

【0014】まず、プリンター本体の電源が投入されるとプリントの準備としてヘッドからのインクの吐出を確実にするため回復動作が行われる。すると空気加圧ポンプ2の大気開放側27にあった軸23は不図示のモータ等により駆動され、A方向に移動させられる(図2(a))。このとき弁24により連通口22が塞がれながら圧縮されるので空気加圧ポンプ2内の空気は加圧される。その加圧された空気はチューブ10を通り小インク部屋4を加圧する。小インク部屋4が加圧されると弁機構7が働き密閉状態になりインクはインクジェットヘッド1へと押し出され、ノズル内の乾燥したインクやゴミ等はノズルの外に排出される。小インク部屋4は大インク部屋5に比して十分に小さいので空気加圧ポンプの容量があまり大きくなくても十分に小インク部屋4の空気圧を高めることができ効率よくインクを加圧できる。

【0015】次に、空気加圧ポンプ2内のピストン21が膨張側(図2(b)のB方向)に動きだすと、弁24と連通口22の間に空隙が開き小インク部屋4内の空気部は大気と連通される。このとき、大インク部屋5には通気孔6が開いているので小インク部屋4と大インク部屋5は大気に開放されることになり、インクの液面が同じになるまでインクが弁機構7を通り大インク部屋5から小インク部屋4に流入する。

【0016】このようにしてインクが消費されていくと次第にインクカートリッジ内に空気が多くなっていくが、本実施例のように容積の小さな部屋を加圧する構造にすると、インクが減ってもその小部屋内の空気の絶対量が少ないので効率よく加圧できる。上記の回復動作は何も電源スイッチが投入されたときのみでなく印字品位が落ちたとき等に隨時行ってもよい。

【0017】なお、大インク部屋5内の通気孔6であるが、これはインクカートリッジ3単体時には閉塞しているが本体に取付けられたときに不図示のカム等により開く構成にしてもよい。

【0018】図5は上記回復動作のための機構を備えたインクジェットヘッドカートリッジ(IJC)として装着したインクジェット記録装置(IJRA)の一例を示す外観斜視図である。

【0019】図において、120はプラテン124上に送紙されてきた記録紙の記録面に對向してインク吐出を行うノズル群を具えたインクジェットヘッドカートリッジ(IJC)である。116はIJC120を保持するキャリッジHCであり、駆動モータ117の駆動力を伝達する駆動ベルト118の一部と連結し、互いに平行に配設された2本のガイドシャフト119A及び119Bと摺動可能とすることにより、IJC120の記録紙の全幅にわたる往復移動が可能となる。

【0020】126はヘッドであり、IJC120の移動経路の一端、例えばホームポジションと對向する位置

20に配設される。伝動機構123を介したモータ122の駆動力によって、ヘッド回復装置126を動作せしめ、IJC120のキャッピングを行う。このヘッド回復装置126のキャップ部126AによるIJC120へのキャッピングに関連させて、ヘッド回復装置126内に設けた適宜の吸引手段によるインク吸引もしくはIJC120へのインク供給経路に設けた適宜の加圧手段によるインク圧送を行い、インクを吐出口より強制的に排出させることによりノズル内の増粘インクを除去する等の吐出回復処理を行う。また、記録終了時等にキャッピング

30を施すことによりIJCが保護される。

【0021】130はヘッド回復装置126の側面に配設され、シリコンゴムで形成されるワイピング部材としてのブレードである。ブレード130はブレード保持部材130Aにカンチレバー形態で保持され、ヘッド回復装置126と同様、モータ122及び伝動機能123によって動作し、IJC120の吐出面との係合が可能となる。これにより、IJC120の記録動作における適切なタイミングで、あるいはヘッド回復装置126を用いた吐出回復処理後に、ブレード130をIJC120

40の移動経路中に突出させ、IJC120の移動動作に伴ってIJC120の吐出面における結露、濡れあるいは塵埃等を拭き取るものである。

【0022】図3は本発明を実施した第2の実施例の概略図である。

【0023】これは図1のインク供給系を4色並べたもので、イエロー、マゼンタ、シアン、ブラック、の各色のインクジェットヘッドを設けカラー記録用とし、さらにポンプを一つとしたものである。この場合、高価なポンプが一つでよく動力源も一つになりコストダウンになる。その他の構成、効果は第1の実施例と全く同じであ

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る。

【0024】図4は本発明を実施した第3の実施例の概略図である。

【0025】これは第1の実施例のインクカートリッジの抜き差しを左右方向でなく上下方向からできるようにしたものである。空気側の針12はインク側の針12に比して長くなっている。インク8の液面より上方に突き出るようになっている。これを4色並べてカラー記録用とし、第2の実施例のように空気加圧ポンプを一つにしてもよい。その他の構成、効果は第1の実施例と全く同じである。

【0026】本発明は、特にインクジェット記録方式の中でも、熱エネルギーを利用して飛翔液滴を形成し、記録を行うインクジェット記録方式の記録ヘッド、記録装置において、優れた効果をもたらすものである。その代表的な構成や原理については、例えば、米国特許第4723129号明細書、同第4740796号明細書に開示されており、本発明はこれらの基本的な原理を用いて行うものが好ましい。この記録方式はいわゆるオンデマンド型、コンティニュアス型のいずれにも適用可能である。この記録方式を簡単に説明すると、液体（インク）が保持されているシートや液路に対応して配置されている電気熱変換体に、記録情報に対応して液体（インク）に核沸騰現象を越え、膜沸騰現象を生じるような急速な温度上昇を与えるための少なくとも一つの駆動信号を印加することによって、熱エネルギーを発生せしめ、記録ヘッドの熱作用面に膜沸騰を生じさせる。このように液体（インク）から電気熱変換体に付与する駆動信号に一対一対応した気泡を形成できるため、特にオンデマンド型の記録法には有効である。この気泡の成長、収縮により吐出孔を介して液体（インク）を吐出させて、少なくとも一つの滴を形成する。この駆動信号をパルス形状とすると、即時適切に気泡の成長収縮が行われるので、特に応答性に優れた液体（インク）の吐出が達成でき、より好ましい。このパルス形状の駆動信号としては、米国特許第4463359号明細書、同第4345262号明細書に記載されているようなものが適している。なお、上記熱作用面の温度上昇率に関する発明の米国特許第4313124号明細書に記載されている条件を採用すると、さらに優れた記録を行うことができる。

【0027】記録ヘッドの構成としては、上述の各明細書に開示されているような吐出孔、液流路、電気熱変換体を組み合わせた構成（直線状液流路又は直角液流路）の他に、米国特許第4558333号明細書、米国特許第4459600号明細書に開示されているように、熱作用部が屈曲する領域に配置された構成を持つものも本発明に含まれる。加えて、複数の電気熱変換体に対して、共通するスリットを電気熱変換体の吐出孔とする構成を開示する特開昭59年第123670号公報や熱エネルギーの圧力波を吸収する開孔を吐出部に対応させる

構成を開示する特開昭59年第138461号公報に基づいた構成においても本発明は有効である。

【0028】さらに、本発明が有効に利用される記録ヘッドとしては、記録装置が記録できる記録媒体の最大幅に対応した長さのフルラインタイプの記録ヘッドがある。このフルラインヘッドは、上述した明細書に開示されているような記録ヘッドを複数組み合わせることによってフルライン構成したものや、一体的に形成された一個のフルライン記録ヘッドであってもよい。

10 【0029】加えて、装置本体に装着されることで、装置本体との電気的な接続や装置本体からのインクの供給が可能になる交換自在のチップタイプの記録ヘッド、あるいは記録ヘッド自体に一体的に設けられたカートリッジタイプの記録ヘッドを用いた場合にも本発明は有効である。

【0030】また、本発明の記録装置に、記録ヘッドに対する回復手段や、予備的な補助手段等を付加することは、本発明の記録装置を一層安定にすることができるものである。これらを具体的に挙げれば、記録ヘッドに対しての、キャッピング手段、クリーニング手段、加圧あるいは吸引手段、電気熱変換体あるいはこれとは別の加熱素子、あるいはこれらの組み合わせによる予備加熱手段、記録とは別の吐出を行う予備吐出モードを行う手段を付加することも安定した記録を行うために有効である。

20 【0031】さらに、記録装置の記録モードとしては黒色等の主流色のみを記録するモードだけではなく、記録ヘッドを一体的に構成したものか、複数個を組み合わせて構成したものかのいずれでもよいが、異なる色の複色カラー又は、混色によるフルカラーの少なくとも一つを備えた装置にも本発明は極めて有効である。

30 【0032】以上説明した本発明実施例においては、液体インクを用いて説明しているが、本発明では室温で固体状であるインクであっても、室温で軟化状態となるインクであっても用いることができる。上述のインクジェット装置ではインク自体を30℃以上70℃以下の範囲内で温度調整を行ってインクの粘性を安定吐出範囲にあるように温度制御するものが一般的であるから、使用記録信号付与時にインクが液状をなすものであればよい。

40 【0033】加えて、熱エネルギーによるヘッドやインクの過剰な昇温をインクの固形状態から液体状態への状態変化のエネルギーとして使用せしめることで積極的に防止するか又は、インクの蒸発防止を目的として放置状態で固化するインクを用いることもできる。いずれにしても熱エネルギーの記録信号に応じた付与によってインクが液化してインク液状として吐出するものや記録媒体に到達する時点ではすでに固化し始めるもの等のような、熱エネルギーの付与によって初めて液化する性質をもつインクの使用も本発明には適用可能である。

50 【0034】このようなインクは、特開昭54-568

47号公報あるいは特開昭60-71260号公報に記載されるような、多孔質シート凹部又は貫通孔に液状又は固体物として保持された状態で、電気熱変換体に対して対向するような形態としてもよい。

【0035】本発明においては、上述した各インクに対して最も有効なものは、上述した膜沸騰方式を実行するものである。

【0036】

【発明の効果】以上説明したように本発明によれば、インクカートリッジ内を大小2つの小部屋に区切り、小さい方の部屋に空気加圧ポンプで加圧することによって、インクカートリッジ内のインクが減少して空気の容積が多くなってもインクを効率よく加圧することができるという効果がある。また、空気で加圧するのでゴミも出ない。

【図面の簡単な説明】

【図1】本発明を実施した第1の実施例の概略図。

【図2】(a), (b)は本発明を実施した第1の実施例の空気加圧ポンプの概略図。

【図3】本発明を実施した第2の実施例の概略図。

【図4】本発明を実施した第3の実施例の概略図。

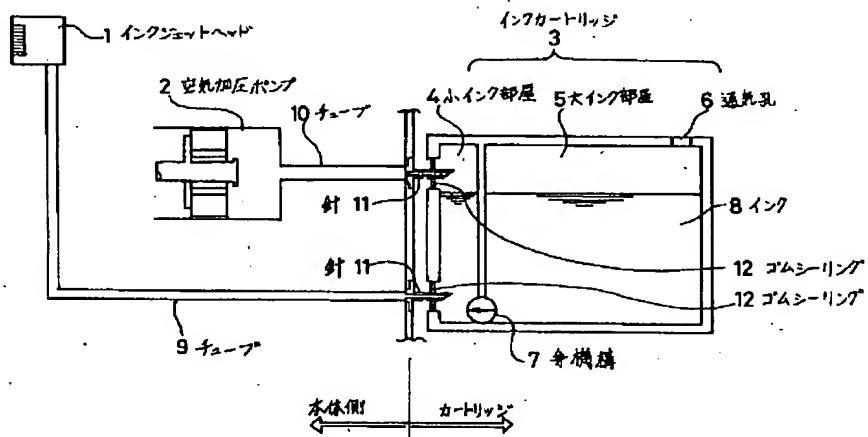
【図5】本発明により得られたインク供給系を具備した

インクジェット記録装置の一例を示す外観斜視図。

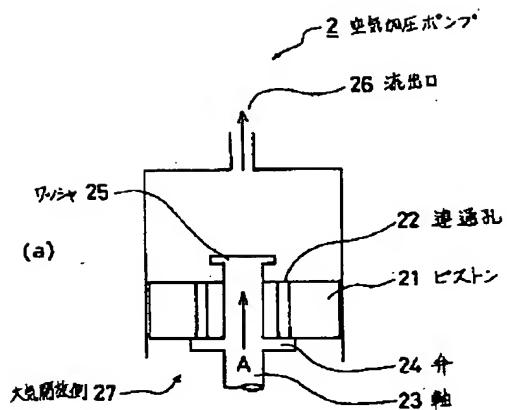
【符号の説明】

- |    |             |
|----|-------------|
| 1  | インクジェットヘッド  |
| 2  | 空気加圧ポンプ     |
| 3  | インクカートリッジ   |
| 4  | 小インク部屋      |
| 5  | 大インク部屋      |
| 6  | 通気孔         |
| 7  | 弁機構         |
| 8  | インク         |
| 9  | インクチューブ     |
| 10 | エアーチューブ     |
| 11 | 中空針         |
| 12 | ゴムシーリング     |
| 21 | ピストン        |
| 22 | 連通口         |
| 23 | 軸           |
| 24 | 弁           |
| 25 | ワッシャ        |
| 26 | シリンダーの流出口   |
| 27 | シリンダーの大気開放側 |

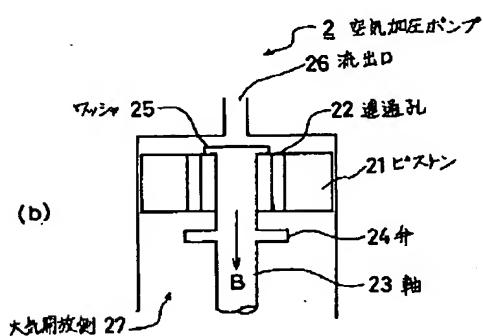
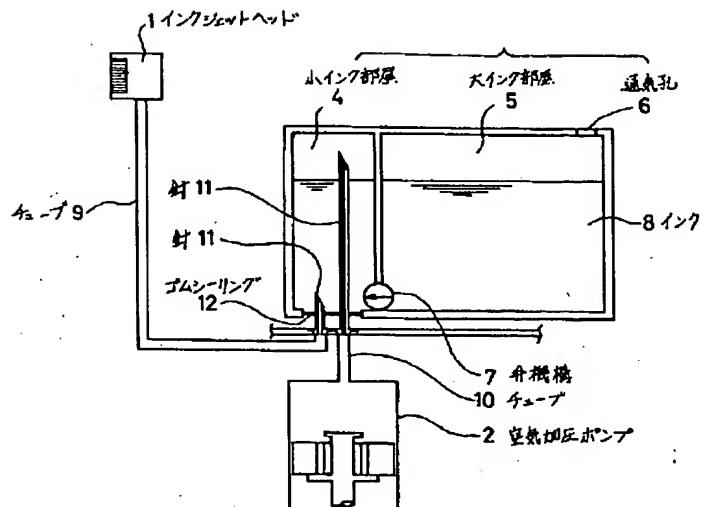
【図1】



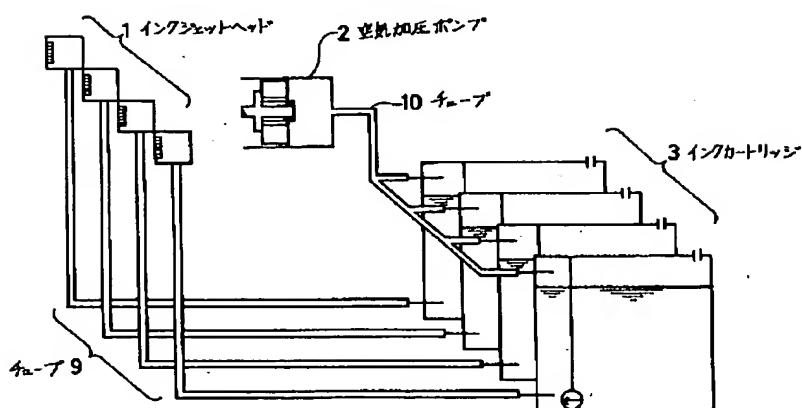
【図2】



【図4】



【図3】



【図5】

